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Research

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# Phytochemical and Antibacterial Properties of Echinophora Orientalis Essential Oil against Staphylococcus aureus in Soup



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## ABSTRACT

Using of chemical preservatives in food may have harmful effects on human health and reduce food safety; Natural preservatives can be used to improve food safety. Echinophora Orientalis is one of the medicinal herbs that traditionally has been used as natural preservative. The objective of the present investigation was to determine the chemical composition and antimicrobial effect of E. orientalis essential oil (EO) against Staphylococcus aureus in a food model. In order to preparing E. orientalis EO, the aerial parts of the plant were collected from Binalud mountain in Nishapur, East of Iran. The EO was extracted using Clevenger and its chemical composition was determined by Gas chromatography-mass spectrometry. Assessment of antibacterial activity of the EO was performed by inoculating the amount of  $10^3$  cfu/ml S. aureus into a certain amount of soup samples. Different concentrations of the EO (6.25, 12.5, 25  $\mu\text{g ml}^{-1}$ ) added into the soup samples. The antimicrobial activity of different concentrations of the EO on S. aureus was examined in the commercial barley soup kept under fridge condition in 1, 2, 3, 4, 5 days after S. aureus inoculation. In total 43 components were identified in E. orientalis EO by GC-MS analysis, comprising 99.05% of the volatile oil, of which  $\gamma$ -decalactone (21.15%),  $\beta$ -cis-Ocimene (15.27%), Linalool L (8.82%), Spathulenol (7.74 %), Eugenol methyl ether (6.61%) were the major components. The EO showed strong antimicrobial activity against tested bacteria, so that no bacterial growth was observed in concentrations of 12.5  $\mu\text{g ml}^{-1}$  and 25  $\mu\text{g ml}^{-1}$  five days after bacterial inoculation, but bacterial growth was observed at concentrations of 6.25  $\mu\text{g ml}^{-1}$ . Average growth of bacteria in concentrations of 6.25, within five days counting were respectively 34 and 35 respectively  $62.33 \pm 4.07$ ,  $42.66 \pm 3.02$ ,  $16 \pm 0.81$ ,  $1.33 \pm 0.65$ , 0 CfU/ml ( $p < 0.05$ ). Evaluation of the sensory properties showed that concentration of 6.25  $\mu\text{g ml}^{-1}$  of the EO was the most acceptable concentration. It was concluded that E. orientalis EO is a strong preservative and a flavoring agent in foods.

Key words: Echinophora Orientalis, Essential oil, GC-MS, Staphylococcus aureus, Soup.

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